

CLAIMS

1. A method for time synchronizing a second base station with a first
2 base station comprising:
 measuring a round trip delay interval of transmissions from the
4 first base station to a mobile station in communication with the first base
 station and back from the mobile station to the first base station;
6 receiving at the second base station communications transmitted by
 the mobile station and noting the time of reception;
8 determining an estimate of a delay which occurs between
 transmission by the mobile station and reception by the second base
10 station; and
 computing a timing correction value in accordance with said
12 estimate of the delay, said noted time of reception, and said measured
 round trip delay interval.
2. The method of claim 1 further comprising receiving at the second
2 base station a message indicative of the identity of the mobile station to assist the
 second base station in said receiving communications from the mobile station.
3. The method of claim 2 further comprising sending the message
2 indicative of the identity of the mobile station from the first base station to the
 second base station.
4. The method of claim 3 wherein said sending the message from the
2 first base station to the second base station comprises:

4 sending the message from the first base station to the second base station
via a base station controller in communication with the first base station and the
second base station.

2 5. The method of claim 3 wherein said sending the message from the
first base station to the second base station comprises:

4 receiving at the first base station communications from a plurality of
mobile stations;

6 selecting a mobile station most likely to be able to communicate with the
second base station; and

sending the message indicative of the identity of the mobile station.

2 6. The method of Claim 5 wherein said selecting a mobile station most
likely to be able to communicate with the second base station comprises:

selecting a mobile station furthest from the first base station.

2 7. The method of Claim 5 wherein said selecting a mobile station most
likely to be able to communicate with the second base station comprises:

selecting a mobile station closest from the first base station.

2 8. The method of Claim 5 wherein said selecting a mobile station most
likely to be able to communicate with the second base station comprises:

4 selecting a mobile station in accordance with the state of a PN spreader in
the mobile station.

9. The method of claim 5 wherein said selecting a mobile station most
2 likely to be able to communicate with the second base station comprises:

selecting a mobile station in accordance with the sector of the first base
4 station being used for communication with the mobile station.

10. The method of claim 5 wherein said selecting a mobile station most
2 likely to be able to communicate with the second base station comprises:

selecting a mobile station in accordance with said measured round trip
4 delay interval.

11. An apparatus for time synchronizing a second base station with a
2 first base station comprising:

a first base station configured to:

4 measure a round trip delay interval of transmissions from said first
base station to a mobile station in communication with said first base
6 station and back from the mobile station to said first base station; and

a second base station configured to:

8 receive communications transmitted by the mobile station and
noting the time of reception;

10 determine an estimate of a delay which occurs between
transmission by the mobile station and reception by said second base
12 station; and

compute a timing correction value based upon the estimate of the
14 delay, the time of reception, and the measured round trip delay interval.

12. The apparatus of claim 11 wherein said second base station is
2 further configured to receive a message indicative of the identity of the mobile

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station to assist said second base station to receive communications from the
4 mobile station.

13. The apparatus of claim 12 wherein said first base station is further
2 configured to send the message indicative of the identity of the mobile station to
said second base station.

14. The apparatus of claim 13 wherein said first base station is further
2 configured to send the message to said second base station via a base station
controller in communication with said first base station and said second base
4 station.

15. The apparatus of claim 13 wherein said first base station is further
2 configured to:
receive communications from a plurality of mobile stations; and
4 select a mobile station most likely to be able to communicate with said
second base station.

16. The apparatus of Claim 15 wherein said first base station is
2 configured to select the mobile station most likely to be able to communicate
with said second base station as a mobile station furthest from said first base
4 station.

17. The apparatus of Claim 15 wherein said first base station is
2 configured to select the mobile station most likely to be able to communicate
with said second base station as a mobile station closest from said first base
4 station.

18. The apparatus of Claim 15 wherein said first base station is
2 configured to select the mobile station most likely to be able to communicate
with said second base station in accordance with the state of a PN spreader in the
4 mobile station.

19. The apparatus of claim 15 wherein said first base station is
2 configured to select the mobile station most likely to be able to communicate
with said second base station in accordance with the sector of said first base
4 station being used for communication with the mobile station.

20. The apparatus of claim 15 wherein said first base station is
2 configured to select the mobile station most likely to be able to communicate
with said second base station in accordance with said measured round trip delay
4 interval.

21. A method for synchronizing a base station with a wireless
2 communication system upon the base station's power up, comprising:
disabling a transmission from the base station;
4 obtaining initial timing at the base station.

22. The method of claim 21 wherein said obtaining initial timing at the
2 base station comprises:
obtaining initial timing at the base station in accordance with a timing
4 signal provided from a base station controller.

23. The method of claim 21 wherein said obtaining initial timing at the
2 base station comprises:

obtaining initial timing at the base station in accordance with a timing
4 signal provided over a backhaul.

24. The method of claim 21 wherein said obtaining initial timing at the
2 base station comprises:

obtaining initial timing at the base station in accordance with a timing
4 signal provided from a WWW receiver.

25. The method of claim 21 wherein said obtaining initial timing at the
2 base station comprises:

obtaining initial timing at the base station in accordance with an
4 intermittent timing signal.

26. The method of claim 21 further comprising:
2 receiving at the base station signals transmitted from a mobile station; and
adjusting timing of the base station in accordance with said received
4 signals.

27. The method of claim 26 wherein said receiving at the base station
2 signals transmitted from a mobile station comprises:

providing to the base station information about identity of the mobile
4 station;

estimating at the base station distance to the mobile station; and
6 receiving at the base station signals transmitted from the mobile station in
accordance with said provided information and said estimated distance.

28. The method of claim 27 wherein said estimating at the base station
2 distance to the mobile station comprises:
estimating at the base station time delay to the mobile station.

29. The method of claim 27 wherein said estimating at the base station
2 distance to the mobile station comprises:
assuming that the mobile station is located adjacent to the base station

30. The method of claim 27 wherein said estimating at the base station
2 distance to the mobile station comprises:
estimating at the base station distance to the mobile station in accordance
4 with a round trip delay interval of transmissions from a first base station to the
mobile station in communication with the first base station and back from the
6 mobile station to said first base station.

31. The method of claim 27 wherein said estimating at the base station
2 distance to the mobile station comprises:
estimating at the base station distance to the mobile station in accordance
4 with:

a first round trip delay interval of transmissions from a first base
6 station to the mobile station in communication with the first base station
and back from the mobile station to the first base station; and

8 a second round trip delay interval of transmissions from a second
base station to the mobile station in communication with the second base
10 station and back from the mobile station to the second base station.

2 32. The method of claim 26 wherein adjusting timing of the base
station in accordance with said received signals comprises:

4 adjusting timing of the base station in accordance with a time offset
between an estimated PN offset of the mobile station and an actual PN offset of
the mobile station.

2 33. The method of claim 26 further comprising:
providing the mobile station with an identity of the base station; and
4 transmitting signals at successively increasing power levels from the base
station in accordance with said adjusted timing until the mobile station detects
said transmitted signals.

2 34. The method of claim 33 wherein said providing the mobile station
with an identity of the base station comprises:
providing the mobile station with a pilot PN code offset.

2 35. The method of claim 33 wherein said providing the mobile station
with an identity of the base station comprises:
providing the mobile station with a pilot PN code.

2 36. The method of claim 33 further comprising:
synchronizing timing of the base station with at least one base station
communicating with the mobile station.

2 37. The method of claim 36 wherein said synchronizing timing of the
base station with at least one base station communicating with the mobile station
comprises:

4 initiating a communication between the base station and the mobile
station;

6 measuring a first round trip delay interval of transmissions from the base
station to the mobile station in communication with the base station and back
8 from the mobile station to the base station;

measuring a second round trip delay interval of transmissions from the at
10 least one base station communicating with the mobile station and back from the
mobile station to the at least one base station communicating with the mobile
12 station;

measuring at the mobile station a time difference between the time of
14 receipt of a transmission from the at least one base station communicating with
the mobile station and the time of receipt of a transmission from the base station
16 communicating with the mobile station; and

computing a timing correction value based upon, said measured first
18 round trip delay interval, said measured second round trip delay interval, and
said measured time difference.

38. The method of claim 36 further comprising:

2 repeating said synchronizing timing of the base station with at least one
base station communicating with the mobile station for all mobile stations within
4 the coverage area of the base station.

39. The method of claim 36 wherein synchronizing timing of the base
2 station with at least one base station communicating with the mobile station
comprises the method as claimed in claim 1.

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40. A apparatus for synchronizing a base station with a wireless
2 communication system upon the base station's power up, comprising:
a transmitter;
4 a processor communicatively coupled to said transmitter; and
a storage medium coupled to said processor and containing a set of
6 instructions executable by said processor to:
disable said transmitter; and
8 obtain initial timing.

41. The apparatus of claim 40 wherein said processor obtains initial
2 timing by executing a set of instructions to:
obtain initial timing in accordance with a timing signal provided from a
4 base station controller.

42. The apparatus of claim 40 wherein said processor obtains initial
2 timing by executing a set of instructions to:
obtain initial timing in accordance with a timing signal provided over a
4 backhaul.

43. The apparatus of claim 40 wherein said processor obtains initial
2 timing by executing a set of instructions to:
obtain initial timing in accordance with a timing signal provided from a
4 WWW receiver.

44. The apparatus of claim 40 wherein said processor obtains initial
2 timing by executing a set of instructions to:
obtain initial timing in accordance with an intermittent timing signal.

45. The apparatus of claim 40 further comprising:

2 a receiver, communicatively coupled to said processor, configured to
receive signals transmitted from a mobile station; and wherein
4 said processor executes a set of instructions to:
adjust timing of the base station in accordance with the received
6 signals.

46. The apparatus of claim 45 wherein said processor further executes a
2 set of instructions to:

obtain information about identity of the mobile station; and
4 estimate a distance from the base station to the mobile station; and
wherein the receiver is further configured to:
6 receive signals transmitted from the mobile station in accordance
with the provided information and the estimated distance.

47. The apparatus of claim 46 wherein said processor estimates a
2 distance from the base station to the mobile station by executing a set of
instructions to:

4 estimate a time delay between the base station and the mobile station.

48. The apparatus of claim 46 wherein said processor estimates a
2 distance from the base station to the mobile station by executing a set of
instructions in accordance with an assumption that the mobile station is located
4 adjacent to the base station.

49. The apparatus of claim 46 wherein said processor estimates a distance from the base station to the mobile station by executing a set of instructions to:

estimate distance from the base station to the mobile station in accordance with a round trip delay interval of transmissions from a first base station to the mobile station in communication with said first base station and back from the mobile station to said first base station.

50. The apparatus of claim 46 wherein said processor estimates a distance from the base station to the mobile station by executing a set of instructions to:

estimate a first round trip delay interval of transmissions from a first base station to the mobile station in communication with said first base station and back from the mobile station to said first base station; and

estimate a second round trip delay interval of transmissions from a second base station to the mobile station in communication with said second base station and back from the mobile station to the second base station.

51. The apparatus of claim 45 wherein said processor adjusts timing of the base station in accordance with said received transmission by executing a set of instructions to:

adjust timing of the base station in accordance with a time offset between an estimated PN offset of the mobile station and an actual PN offset of the mobile station.

52. The apparatus of claim 45 further comprising:

- 2 a mobile station configured to obtain information about identity of the
base station; and
- 4 said transmitter configured to transmit signals at successively increasing
power levels from the base station in accordance with the adjusted timing until
- 6 the mobile station detects the transmitted signals.

53. The apparatus of claim 52 wherein the mobile station is configured
2 to obtain information about a pilot PN code offset of the base station.

54. The apparatus of claim 52 wherein the mobile station is configured
2 to obtain information about a pilot PN code of the base station.

55. The apparatus of claim 45 said processor further executes a set of
2 instructions to synchronize timing of the base station with at least one base
station communicating with said mobile.

56. The apparatus of claim 45 wherein said processor synchronizes
2 timing of the base station with at least one base station communicating with the
mobile station by executing a set of instructions to:

4 initiate a communication between the base station and the mobile station;
 measure a first round trip delay interval of transmissions from the base

6 station to the mobile station in communication with the base station and back
from the mobile station to the base station;

8 measure a second round trip delay interval of transmissions from the at
least one base station communicating with the mobile station and back from the

10 mobile station to the at least one base station communicating with said mobile;
and

12 compute a timing correction value in accordance with the first round trip
delay interval, the second round trip delay interval, and a time difference
14 provided by the mobile station; and wherein
the mobile station is configured to:
16 measure the time difference between the time of receipt of a
transmission from the at least one base station communicating with the
18 mobile station and the time of receipt of a transmission from the base
station.

57. The apparatus of claim 54 wherein said processor repeats said
2 synchronizing timing of the base station with at least one base station
communicating with the mobile station for all mobile stations within the
4 coverage area of the base station.

58. The apparatus of claim 54 wherein further comprises the apparatus
2 as claimed in claim 11.